EOD TEST PROCEDURE

TP 104B	
Title Grabner Vapor Pressure Test	**Page Number** 1 of 23
Originator Carl Scarbro	**Supersedes** TP 104A
Responsible Organization Fuels and Chemical Analysis Branch	**Computer Program** TP 104 Instrument DB TP 104 Analysis DB
Type of Test Report Data Form and Computer Report	**Data Form Number** NA
Report Distribution Project Officer and Chemistry Lab File	**Implementation Date** 09-30-94

Implementation Approval

Original Test Procedure Authorized by EPCN #129 on 12-10-93

Revision Description

(1) 09-30-94 The purpose of this change is to revise the procedure as described in EPCN #170.

Note: Specific brand names in EPA/EOD procedures are for reference only and are not an endorsement of those products.

Table of Contents

Attachments

1. Purpose

This method describes the determination of vapor pressure in gasoline and gasoline-oxygenate blends using the Grabner model CCA-VPS vapor pressure analyzer.

The instrument measures the Total Pressure (Ptot) exerted by a fuel sample under the conditions of 1 part liquid sample to 4 parts evacuated space at 100 °F. The Reid Vapor Pressure (RVP) is determined by a correlation equation relating the two pressures.

The Grabner also provides an estimate of the True Vapor Pressure (Pabs) of the liquid and the Dissolved Gas Pressure (Pgas) of the sample under the above test conditions.

2. Test Article Description

A gasoline sample no less than 118 mL (4 ounces) and no greater than 7.6 L (2 gallons) in volume

3. References

3.1 "Federal Register," Vol. 58, No. 50, Wednesday, March 17, 1993, Appendix E,Test Method for Determining Reid Vapor Pressure (RVP) of Gasoline and Gasoline-Oxygenated Blends; Method 3-Evacuated Chamber Method, pp. 14488-90

3.2 American Society for Testing and Materials (ASTM) Standard Practice E-177-86, "Standard Practice for use of the Terms Precision and Bias in ASTM Test Methods"

3.3 ASTM Manual MNL7, "Manual on Presentation of Data and Control Chart Analysis: 6th Edition"

3.4 "1992 Annual Book of ASTM Standards," Section 5, Petroleum Products, Lubricants, and Fossil Fuels

3.2.1 E 1 Specification for ASTM Thermometers

3.2.2 D 5191-91 "Vapor Pressure of Gasoline and Gasoline Oxygenate Blends" (Mini Method)

3.5 FileMaker Pro User's Guide

3.6 Vapor Pressure Tester CCA-VPS Operation Manual, Grabner operating manual

3.7 “Princo Mercury Barometer Instruction Manual”

4. Required Equipment

4.1 Grabner Model CCA-VPS, vapor pressure analyzer

4.2 Transfer tube

4.3 Vacuum pump

4.4 McLeod gauge

4.5 National Institute of Standards and Technology (NIST) traceable thermometers

4.6 U.S. Signal Corp. Mercury Barometer

4.7 Ice-water bath

4.8 Reagents, pure grade unless specified otherwise

4.8.1 n-pentane (pure grade or commercial) [109-66-0]

4.8.2 2,2,4-trimethylpentane (“iso-octane”) [540-84-1]

4.8.3 2,2-dimethylbutane (“neohexane”) [75-83-2]

4.8.4 3-methylpentane [94-14-0]

4.8.5 Process control gasoline: substantially similar to the emission certification gasoline specified in 40 CFR 86.113-92

4.9 Environmental Protection Agency (EPA)-approved fume hood

4.10 8-ounce clear PVC-coated bottles

4.11 Lab Coat

4.12 Safety Glasses

4.13 Wiper Cloths

4.14 Rubber Gloves

4.15 Fuels Field Inspection, EPA Form 3500-5 (see TP 109)

4.16 Control Chart for the Range of Duplicate Analyses, Form 109-01 (see TP 109)

4.17 Control Chart for Individual Observations, Form 109-02 (see TP 109)

5. Precautions

5.1 Gasoline, n-pentane, 2,2,4-trimethylpentane, 2,2-dimethylbutane, and 3-methylpentane are flammable and toxic. Specific procedures for handling these materials are listed in their respective Material Safety Data Sheets (MSDS) on file in "Fuels and Chemical Analysis Branch" (FCAB).

The analyst must be familiar with these MSDS procedures before performing this procedure.

5.2 The first test performed on a sample must be for vapor pressure.

5.3 Samples and standards must be chilled in an ice-water bath to 32-40 °F before they are opened and analyzed.

5.4 Standards must meet the same criteria as the samples for sample volume, temperature, and air saturation.

6. Visual Inspection

6.1 Upon receipt, all sample containers are inspected for broken seals and leaks as described in the TP 109, Attachment E, "FCAB Enforcement Chain-of-Custody Procedure."

6.2 Before analysis, all samples and standards are cooled to 32-40 °F and inspected for sample volume. Samples in glass containers also are inspected for clarity and phase separation.

6.3 After analysis, samples and standards in metal containers are cooled to 32-40 °F and inspected for clarity and phase separation.

7. Test Article Preparation

7.1 Plan the analysis batch run.

Prepare only as many samples as can be analyzed in the available time.

Samples and standards are chilled, air saturated, and analyzed in batches. Reagent and process control gasoline standards must be handled the same as samples.

Chill adequate quantities of standards to provide for an initial analysis of 2,2-dimethylbutane, analysis of a reagent standard listed in Step 4.8 or a process control gasoline standard after every 20 samples, and a final analysis of a reagent standard listed in Step 4.8

7.2 Cool the samples and standards to 32-40 °F in an ice-water bath.

The ice-water bath is a slurry of crushed ice and water. The bath's depth must be such that the surface of the slurry is at or above the surface of the sample in the container.

To ensure that the sample has reached the above temperature, directly measure the temperature of a similar liquid, in a similar container at a similar start temperature, placed in the ice-water bath at the same time as the samples.

7.3 Examine the calibration sticker on the front of the Grabner instrument to be used to determine the calibration date.

If the instrument has not been calibrated in the last 6 months, calibrate the instrument as outlined in Attachment A or obtain an instrument that has been calibrated in the last 6 months.

Note: More than one Grabner instrument can be used for a batch run.

7.4 Turn on the computer (if it is off) that is located across from the vapor pressure hood in the analysis room.

Verify the correct name on the hard drive icon and that the computer's internal time and date are correct.

7.5 Daily Grabner Analyzer Verification

7.5.1 Open the file named "TP 104 Instrument Data Base." The input format (see Attachment B) will automatically come up on the screen.

Note: The database has a number of built-in data checks which will appear at the bottom of the record when unusual or out-of-tolerance values are detected, see Step 10.1.

7.5.2 Append a new record.

Enter the analyst's initials, the instrument number, and its calibration date into the database. The database automatically enters the current date and time.

7.5.3 Read the barometric pressure in inches of mercury, according to the mercury barometer's instruction manual.

Enter that value in the column labeled "Mercury Barometer" in the database.

7.5.4 Verify the Grabner pressure transducer accuracy.

Select "Measure" on the instrument with the "Task" key.

Read the pressure to the right of "p=" on the Grabner's screen and enter it in the column labeled "Grabner Barometer Reading" in the database.

The database automatically converts the mercury barometer reading to psia, subtracts it from the Grabner's barometer reading, and displays the results in the column labeled "Grabner-Mercury."

The absolute difference must not exceed 0.030 psia.

If it does, the transducer must be calibrated as described in Attachment A.

7.5.5 Verify that the T(measure) is 100 °F. If not, the value must be edited, with the cursor control on the front of the instrument, to 100 °F.

Enter "Yes" under the column labeled "T(measure) = 100 °F" in the database.

7.5.6 Verify that the Vapor Pressure equation in the instrument's software is:

RVPE = 0.956 * Ptot - 0.35

Display the equation by moving the cursor to the "RVPE" or "DVPE" asterisk and pressing "Task."

If the equation is different, use the cursor keys to alter the values. Once the equation is correct, move the cursor to the "<-" arrow and press the <Task> key.

Enter "Yes" in the database in the column labeled "Vapor Pressure Equation OK?"

Note: Some Grabner models display "DVPE" instead of "RVPE"; either is acceptable.

7.6 Open the file named "TP 104 Analysis Data Base."

The input format (see Attachment C) will automatically come up on the screen. The "Instrument Number" and "Analysis Count" lines shown at the bottom of Attachment C will not appear on the screen initially.

The procedure for bringing these lines to the screen is explained below and should not be performed when the file is first opened.

Note: The database has a number of built-in data checks which will appear at the bottom of the record when unusual or out-of-tolerance values are detected.

The flags monitor saturation and analysis times, Ptot, Pgas, and RVP values. They also indicate missing data or instrument verifications, see Step 10.2.

7.7 Check the sample thermometer in the ice-water bath. It must be within 32-40 °F to proceed with the sample inspection and air saturation.

7.8 Check that there is an adequate amount of ice to maintain temperature.

Remove a chilled sample container from the ice-water bath. Dry the exterior of the container with an absorbent material.

Note: It is recommended that the batch of samples be divided into groups of six or fewer and that the processing of each group be segmented into Steps 7.8 through 7.12.7, Steps 7.13.1 through 7.13.2, and analysis Steps 100 through 107.

This strategy makes it easier to manage the many data entries required for each sample and provides more consistent times between saturations and analyses.

7.9 Append a new record in the database, enter the sample ID, the enforcement standard, and the analyst's initials.

Enter "Yes" to the right of "Temp OK?" indicating that the sample temperature is within 32-40 °F. For special testing situations, enter "No" or "NA" as appropriate.

The database automatically enters the current date as the analysis date.

7.10 Inspect the sample container (glass and metal) for leaks.

Discoloration of any seals placed over the cap indicates a leak.

If there is discoloration or other evidence of a leak, enter "Yes" to the right of "Leaked?" in the database. If no leak is evident, enter "No."

7.11 If the sample is in a glass container, inspect it for phase separation and clarity.

If a sample is phase separated, enter “Yes” to the right of “Phase Sep’d?” in the database.

If it is not phase separated, enter “No.”

If a sample is cloudy, enter “Yes” to the right of “Cloudy?” in the database.

If it is not cloudy, enter “No.”

7.12 Sample volume verification and initial air saturation:

7.12.1 Remove the sample container cap and measure the sample volume with a depth gauge suitable for the specific container.

The gauge must identify 70, 80, and 85 percent of the container capacity.

7.12.2 If the sample volume is less than 70 percent, enter “Yes” to the right of “<70%?” in the database.

If the sample volume is 70 percent or more, enter “No.”

7.12.3 If the sample volume is greater than 85 percent, enter “Yes” to the right of “>85% ?” in the database.

If the sample volume is 85 percent or less, enter “No.”

7.12.4 If the volume is less than 80 percent, do not adjust the sample volume.

Enter “NA” to the right of “Adjust <70% ?”

7.12.5 If the sample volume is greater than 80 percent, pour out enough sample to bring the container contents within the 70-80 percent range.

Under no circumstances may any sample which has been poured out be returned to the container.

Measure the sample volume again.

If the sample volume is less than 70 percent, enter “Yes” to the right of “Adjust <70% ?” in the database.

If the sample volume is 70 percent or more, enter “No.”

7.12.6 Tightly close the container after the sample volume inspection, shake it vigorously for at least 5 seconds, and return it to the ice-water bath.

Record the time of the sample's return to the bath to the right of "Sat 1" in the database.

Use the < ⌘ > and < ; > keys to automatically enter the current time from the computer's clock.

7.12.7 After entering the saturation time for the first sample of the day, select the "find" command and specify the current date in the date field.

This step limits the active data set to the current day's entries and resets the analysis count to indicate the number of samples run on each analyzer for the current day only.

Use the down scroll arrow to display the "Instrument Number" and "Analysis Count" lines at the bottom of the screen.

Check the "Instrument Number" line at the bottom of the screen for the instrument number(s) currently being used.

If it is not listed, contact the Senior Technician.

7.13 Additional air saturation of the sample:

7.13.1 After at least 2 minutes in the ice-water bath, remove the container, dry it with an absorbent material, and then open it momentarily.

Tightly close the container, shake it vigorously for at least 5 seconds, and return it to the ice-water bath.

Record the time the sample is returned to the bath.

Use the < ⌘ > and < ; > keys to automatically enter the current time from the computer's clock.

7.13.2 Repeat Step 7.13.1 one more time, but record the final saturation time to the right of "Sat 3" in the database.

8. Test Procedure

100 Plan the order of the sample run such that the first sample analyzed is the standard 2,2-dimethylbutane.

Every subsequent 20 analyses (per instrument) must be followed by the measurement of either a reagent standard, listed in Section 4.8, or a process control gasoline.

Periodically use the down scroll arrow to access the "Analysis Count" line to monitor when a standard or process control gasoline measurement is due.

The last analysis of the day on each instrument used must be one of the reagent standards listed in Step 4.8.

A duplicate must be performed at least once per day on each instrument used.

For this procedure, a duplicate is defined as an additional instrument analysis of a sample that has been previously chilled and air saturated. The additional analysis is performed without repeating the air saturation process but with the saturated sample at 32-40 °F.

101 After a minimum of 2 minutes has elapsed since the third air saturation, remove the chilled sample container from the ice-water bath.

Dry the exterior of the container with an absorbent material.

Uncap the container, insert the transfer tube, press the <Run> key, then record the analysis time (use the < ⌘ > and < ; > keys) and instument number in the database.

The analysis time is defined as the time when the <Run> key is pressed.

102 When the Grabner display indicates "temp adjust," remove the transfer tube and place the end of the tube under the instrument's carrying handle.

Close the sample container tightly with its cap and return it to the ice-water bath.

103 After approximately 8 minutes, the instrument will display Ptot, Pgas, Pabs, and "RVPE" or "DVPE." The indicated "RVPE" or "DVPE" is the RVP for the sample.

Enter the Ptot, Pgas, and RVP values into the database.

The database automatically calculates the Pabs value from Ptot and Pgas.

If the RVP of the sample exceeds the applicable enforcement standard, the sample must be analyzed as a duplicate.

104 If the Pgas reading does not fall within 0.50-1.00 psia, analyze the sample as a duplicate.

Calculate and plot the range of the duplicate results on Form 109-01.

See Step 106 for analysis of duplicate results.

105 For a standard or a process control gasoline, record the date and the Ptot, as they become available, on the Form 109-02 specific for that standard.

Calculate the moving range and plot both the Ptot and the moving range values. Review the control chart for out-of-control indications (see Attachment D, Pre-1993 Enforcement Season Provisional Control Standard Limits).

Out-of-control indications require immediate corrective action.

Investigate for a shift in the average bias.

Suggested areas to check include, but are not limited to, the following:

Insufficient air saturation of standards
Incorrect sample temperature during air saturation
Instrument calibration
Mislabeled or contaminated standard

Remedy any deficiencies identified and determine whether previous sample results have been affected.

Analyze the process control or reagent standard to verify process control and analyze samples as necessary.

Document investigation findings and remedial actions on the control chart and in the database comment field for the standard.

106 Record the duplicate Ptot values, as they become available, on Form 109-01.

Calculate and plot the range.

Review the control chart for out-of-control indications. Out-of-control indications require immediate corrective action.

Investigate for causes of excessive variability.

Suggested areas to check include, but are not limited to, the following:

Insufficient air saturation of the sample
Use of different samples
Sample contamination
Instrument calibration

Remedy any deficiencies identified and determine whether previous sample results have been affected.

Perform duplicate analyses of the initial sample and another sample to verify process control. If there is not enough initial sample left (less than 70 percent), use any two samples.

Analyze process control standards, reagent standards and samples as necessary.

Document investigation findings and remedial actions on the control chart and in the database comment field for the samples.

107 Samples in metal containers must be examined for clarity and phase separation after each vapor pressure analysis is performed.

Shake the chilled container vigorously for 5 seconds to thoroughly mix the sample and immediately pour approximately 20 percent of the sample volume into a clear glass container.

Observe the sample in the glass container for clarity and phase separation.

If the sample is phase separated, enter “Yes” to the right of “Phase Separated?” in the database.

If it is not phase separated, enter “No.”

If a sample is cloudy, enter “Yes” to the right of “Cloudy?” in the database.

If it is not cloudy, enter “No.”

Discard the sample in the glass container.

108 When the last unknown sample is analyzed, measure the vapor pressure of one of the reagent standards listed in Step 4.8.

109 Select the “TP 104 Report” layout (see Attachment E) and print the day’s analysis results from the TP 104 Database.

Examine the TP 104 Report for completeness and accuracy.

Transcribe the RVP results and applicable comments onto the corresponding EPA Form 3500-5.

Initial the form, writing as closely as possible to the actual data entry.

110 Verify that no transcription errors are in the data entered on EPA Form 3500-5.

Sign and date the TP 104 Report at the bottom.

111 Notify the appropriate FCAB personnel when the data are ready for validation. The validator signs and dates the TP 104 Report when the validation is complete.

9. Data Input

9.1 The instrument verification date and time are automatically entered into the TP 104 Instrument Data Base.

The analyst enters the analyst’s initials, instrument number, calibration date, mercury and Grabner barometer readings, and the status of the T(measure) and vapor pressure equation instrument settings.

9.2 The analysis date and Pabs are automatically entered into the TP 104 Analysis Data Base.

The analyst enters the sample ID, enforcement standard, analyst’s initials, sample conditions, saturation times, analysis time, instrument number, Ptot, Pgas, RVP, and applicable comments.

9.3 Duplicate results are recorded on Form 109-01.

Individual control charts (Form 109-02) are used to record data for each reagent and process control gasoline standard.

10. Data Analysis

10.1 The TP 104 Instrument Data Base automatically flags the operator when:

the instrument calibration is more than 6 months old
the instrument calibration date is a future date
the mercury barometer reading exceeds the normal 28.7-30.0 inHg range
the mercury and Grabner barometer readings differ by more than 0.03 psi, or
the T(measure) or vapor pressure equation status is "No"

The analyst checks and corrects all data entries while the Grabner still displays the test results.

10.2 The TP 104 Analysis Data Base automatically flags the operator when:

the daily instrument verification is missing or deficient
the time between air saturations is less than 2 minutes
the time between analysis and the third air saturation is less than 2 minutes
the RVP entered is not within 0.02 psi of the value calculated from the entered Ptot
the Pgas reading exceeds the 0.50-1.00 psi range
the entered RVP exceeds the enforcement standard
the record is missing a required data entry

The analyst checks and corrects all data entries while the Grabner still displays the test results.

10.3 The analyst reviews the TP 104 Report, EPA Form 3500-5, and the process control charts for accuracy and to confirm compliance with the acceptance criteria in Step 12.6 and Steps 12.9 through 12.14.

10.4 The validator reviews the TP 104 Report, EPA Form 3500-5, and the process control charts for accuracy and to confirm compliance with the acceptance criteria in Step 12.6 and Steps 12.9 through 12.14.

11. Data Output

11.1 The completed EPA Form 3500-5 and the TP 104 Report are filed according to the TP 109 attachment, "FCAB Enforcement Sample Chain-of-Custody Procedure."

11.2 Current Control Chart Forms 109-01 and 109-02 are kept in the log book stored by the instrument.

Charts no longer current will be filed according to the TP 109 attachment, "FCAB Enforcement Sample Chain-of-Custody Procedure."

12. Acceptance Criteria

12.1 The instrument must have been calibrated within the last 6 months.

12.2 The instrument transducer must be within 0.03 psia of a latitude- and temperature-corrected mercury barometer.

12.3 The test temperature setting of the Grabner must be 100 °F.

12.4 The RVP equation must be:

= 0.956 * Ptot - 0.35

12.5 The sample temperature must be within 32-40 °F when the container is first opened.

12.6 The container seal must be intact before measuring the sample volume.

If that is not the case, an explanation must be added to the comments field in the database and entered on EPA Form 3500-5.

12.7 The results of visual inspection of the sample condition (i.e., leaks, phase separation, cloudiness, and sample volume) must be documented.

12.8 The time between air saturations and the time between the last air saturation and analysis must be a minimum of 2 minutes.

12.9 The time between consecutive analyses on a single instrument must be a minimum of 8 minutes (normal instrument cycle time).

12.10 Pgas readings must fall within 0.50-1.00 psia or another analysis (duplicate) must be performed on the sample.

The results of any investigation are documented on the control chart, the database, and EPA Form 3500-5.

12.11 Duplicates are performed on all samples found to exceed the applicable enforcement standard identified for each sample on EPA Form 3500-5 and on at least one sample per day per instrument used.

12.12 Duplicate range values must be within the control limits or an investigation for cause must be performed and reported.

Establishment of process control must be demonstrated before further analyses can be performed.

12.13 The first analysis of the day on each instrument used must be the reagent standard 2,2-dimethylbutane.

Every subsequent 20 analyses on each instrument must be followed by the measurement of either a reagent standard, listed in Step 4.8, or a process control gasoline.

The last analysis of the day on each instrument must be one of the reagent standards listed in Step 4.8.

12.14 Reagent standard and process control gasoline Ptot and moving range values must be within the control limits or an investigation for cause must be performed and reported.

If, during the course of such an investigation, it is determined that any previous analyses may be affected, those samples must be analyzed again.

Establishment of process control must be demonstrated before further analyses can be performed.

13. Quality Control Provisions

13.1 The instrument is calibrated every 6 months.

13.2 The pressure transducer is verified daily.

13.3 Instrument settings are verified daily.

13.4 Samples are visually inspected.

13.5 Pgas values are monitored for every analysis.

13.6 Analyses are done on duplicates, standards, and a process control gasoline.

13.7 Numerous computerized data checks have been incorporated into the database program.

13.8 All analysis data are validated by an independent technician.

13.9 Analysis samples sent to other facilities are resealed with new sample bottle seals, EPA Form 7500-2 (see TP 109 Attachments), and are shipped with a Chain-of-Custody Form 109-03 (see TP 109 Attachments) to ensure sample integrity.

Grabner Model CCA-VPS Instrument Calibration

Transducer Calibration

Connect a McLeod gauge to the vacuum source and the test chamber. Engauge the pressure calibration mode on the instrument by placing the cursor over the “Measure” asterisk and press the “Up” arrow and “Run” key simultaneously.

Apply the vacuum to the test chamber through the drain port. When the McLeod gauge measures less than 0.8 mmHg, convert the reading to hectopascals (hPa). The conversion factor for mmHg (0 °C) to hectopascals is 1.333 hPa/mmHg.

Once the conversion has been done, enter the reading to the right of “Zero=” on the Grabner’s menu screen using the arrow keys. Set the zero by placing the cursor over “*Z” and pressing the “Task” key.

Open the test chamber to the atmosphere by removing the vacuum source from the drain port. Observe the pressure reading to the right of “p=.”

Adjust the reading to match a temperature- and latitude-corrected mercury barometer in hectopascals. The conversion factor for inches of Hg (32 °F) to hectopascals is 33.86 hPa/inHg.

Alter the lower digits of “Gain” (those to the right of it) with the cursor arrows and save the calibration by pressing the “Task” key on the instrument twice.

Repeat the above procedure until the instrument, McLeod gauge, and barometer agree.

Temperature Calibration

Mix a slurry of de-ionized water and ice in a Dewar flask. Insert the NIST thermometer and the instrument RTD to a depth of at least 2 inches. Engauge the temperature calibration mode on the instrument by placing the cursor over the “Measure” asterisk and selecting the “Up” arrow and “Run” key simultaneously.

To engauge the temperature calibration settings move the cursor to the left most “0” on the screen and change the “0” to “1” with the “Up” arrow.

Adjust the zero setting to match the thermometer when the temperature has stabilized on both the thermometer and the RTD by using the arrow keys with the cursor to the right of “Zero=.” Set the zero by placing the cursor over “*Z” and pressing the “Task” key.

Fill a second Dewar flask with water that is within 50-70 °C. Insert the NIST thermometer and the instrument RTD to a depth of at least 2 inches.

Adjust the reading to the right of “T=“ to match the thermometer by altering the lower digits of “Gain” with the cursor arrows. Save the calibration by pressing the “Task” key twice.

Repeat the above procedure until the instrument and the NIST thermometer(s) agree.

TP 104 Instrument Data Base Input Screen

Grabner Daily Verification

Date	Time	Analyst	Instrument Number	Calibration Date	Mercury Barometer in Hg	Grabner Barometer Reading psia	Grabner-Mercury psia	T(measure) = 100°F	Vapor Pressure Equation OK?
8/20/93	15:51	CAS	201-269	8/20/93	28.96	14.21	-0.01	Yes	Yes
8/23/93	08:18	CAS	201-269	8/20/93	29.06	14.29	0.02	Yes	Yes
8/23/93	10:04	CAS	201-206	7/9/93	29.06	14.25	-0.02	Yes	Yes
8/24/93	07:33	CAS	201-206	7/9/93	28.98	14.23	0.00	Yes	Yes
8/24/93	07:34	CAS	201-269	8/20/93	28.98	14.24	0.01	Yes	Yes
8/25/93	11:05	JBK	201-206	7/9/93	29.21	14.36	0.02	Yes	Yes
8/25/93	11:11	JBK	201-269	8/20/93	29.21	14.36	0.02	Yes	Yes
8/26/93	07:10	CAS	201-206	7/9/93	29.30	14.39	0.00	Yes	Yes
8/26/93	07:11	CAS	201-269	8/20/93	29.30	14.39	0.00	Yes	Yes
8/27/93	08:12	CAS	201-269	8/20/93	29.15	14.31	0.00	Yes	Yes
8/27/93	08:13	CAS	201-210	8/17/93	29.15	14.29	-0.02	Yes	Yes
8/30/93	07:09	CAS	201-210	8/17/93	29.11	14.27	-0.02	Yes	Yes
8/30/93	07:10	CAS	201-269	8/20/93	29.11	14.30	0.01	Yes	Yes

TP 104 Analysis Data Base Input Screen

Sample ID **Unleaded Regular Gasoline** Enf Std NA Analyst CAS Analysis Date 12/8/93

Sample Condition		Comments	Times		Instr No.	Test Results	
Temp OK?	Yes		Sat 1	15:02:47	201-206	Ptot	16.27
Leaked?	No		Sat 2	15:31:56		Pgas	0.84
Phase Sep'd?	No		Sat 3	15:34:20		Pabs	15.43
Cloudy?	No		Analysis	17:04:01		RVP	15.20
< 70 % ?	No						
> 85 % ?	No						
Adjust < 70 % ?	NA						

Instrument Number	**196**	**206**	**210**	**256**	**257**	**259**	**260**	**261**	**262**	**269**	**270**
Analysis Count	0	1	0	0	0	0	0	0	0	0	0

Pre-1993 Enforcement Season Provisional Control Standard Limits

Standard	n	Average Ptotal	Lower Control Limit	Upper Control Limit
iso-octane	8	2.55	2.48	2.62
2,2-dimethylbutane	60	10.70	10.60	10.80
n-pentane	8	16.28	16.18	16.38
process control gasoline	31	9.60	9.50	9.70

TP104 Report

Sample ID **Regular Unleaded Gasoline** Enforcement Std NA
Date 12/8/93 Instrument Number 201-206 Analyst CAS

				Test Results	
Temp OK?	Yes	Sat 1	1:29:50 PM	Ptot	12.36
Leaked?	No	Sat 2	13:39	Pgas	0.78
Phase Separated?	No	Sat 3	13:47	Pabs	11.58
Cloudy?	No	Analysis	14:43	RVP	11.47
< 70 % ?	No				
> 85 % ?	No	Comment:			
Adjust < 70 % ?	NA				

Sample ID **Regular Unleaded Gasoline** Enforcement Std NA
Date 12/8/93 Instrument Number 201-206 Analyst CAS

				Test Results	
Temp OK?	Yes	Sat 1	3:02:47 PM	Ptot	13.44
Leaked?	No	Sat 2	15:31	Pgas	0.83
Phase Separated?	No	Sat 3	15:34	Pabs	12.61
Cloudy?	No	Analysis	15:40	RVP	12.50
< 70 % ?	No				
> 85 % ?	No	Comment:			
Adjust < 70 % ?	NA				

Sample ID **Regular Unleaded Gasoline** Enforcement Std NA
Date 12/8/93 Instrument Number 201-206 Analyst CAS

				Test Results	
Temp OK?	Yes	Sat 1	3:02:47 PM	Ptot	11.69
Leaked?	No	Sat 2	15:31	Pgas	0.71
Phase Separated?	No	Sat 3	15:34	Pabs	10.98
Cloudy?	No	Analysis	15:58	RVP	10.83
< 70 % ?	No				
> 85 % ?	No	Comment:			
Adjust < 70 % ?	NA				

Sample ID **Regular Unleaded Gasoline** Enforcement Std NA
Date 12/8/93 Instrument Number 201-206 Analyst CAS

				Test Results	
Temp OK?	Yes	Sat 1	3:02:47 PM	Ptot	13.94
Leaked?	No	Sat 2	15:31	Pgas	0.90
Phase Separated?	No	Sat 3	15:34	Pabs	13.04
Cloudy?	No	Analysis	16:24	RVP	12.98
< 70 % ?	No				
> 85 % ?	No	Comment:			
Adjust < 70 % ?	NA				

Sample ID **Regular Unleaded Gasoline** Enforcement Std NA
Date 12/8/93 Instrument Number 201-206 Analyst CAS

				Test Results	
Temp OK?	Yes	Sat 1	3:02:47 PM	Ptot	9.24
Leaked?	No	Sat 2	15:31	Pgas	0.75
Phase Separated?	No	Sat 3	15:34	Pabs	8.49
Cloudy?	No	Analysis	16:36	RVP	8.48
< 70 % ?	No				
> 85 % ?	No	Comment:			
Adjust < 70 % ?	NA				

Sample ID **Regular Unleaded Gasoline** Enforcement Std NA
Date 12/8/93 Instrument Number 201-206 Analyst CAS

				Test Results	
Temp OK?	Yes	Sat 1	3:02:47 PM	Ptot	14.46
Leaked?	No	Sat 2	15:31	Pgas	0.84
Phase Separated?	No	Sat 3	15:34	Pabs	13.62
Cloudy?	No	Analysis	16:46	RVP	13.47
< 70 % ?	No				
> 85 % ?	No	Comment:			
Adjust < 70 % ?	NA				

Sample ID **Regular Unleaded Gasoline** Enforcement Std NA
Date 12/8/93 Instrument Number 201-206 Analyst CAS

				Test Results	
Temp OK?	Yes	Sat 1	3:02:47 PM	Ptot	16.27
Leaked?	No	Sat 2	15:31	Pgas	0.84
Phase Separated?	No	Sat 3	15:34	Pabs	15.43
Cloudy?	No	Analysis	17:04	RVP	15.20
< 70 % ?	No				
> 85 % ?	No	Comment:			
Adjust < 70 % ?	NA				

I have performed the steps in accordance with the requirements of Test Procedure 104

Analyst's Signature _____ Date _____

I have validated the data in accordance with the requirements of Test Procedure 104

Validator's Signature _____ Date _____